A717

Site Herculaneum Lead
ID # MOD980646373
Break: 2.0
Other:
12-17-02
RM

THE DOE RUN COMPANY

SUITE 300
1801 PARK 270 DRIVE
ST. LOUIS, MO 63146
FAX 314-453-7177

DANIEL L. VORNBERG
VICE PRESIDENT ENVIRONMENTAL AFFAIRS
314-453-7154
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December 17, 2002

Bruce Morrison
Project Manager
USEPA Region VII
901 North 5th
Kansas City, KS 66101

40173894
SUPERFUND RECORDS

Re: Phosphate Treatment of Soils for Reducing Lead Bioavailability

Dear Bruce:

Doe Run is expressly requesting permission to utilize phosphate as a remedy in the Doe Run Resources Corporation Matter at Herculaneum (Docket No. RCRA-7-2000-0018 and CERCLA-7-2000-0029) Administrative Order on Consent effective May 23, 2001 for reducing the bioavailability of soils in a similar way as was approved in the Jasper County, Missouri, ROD. Scientists at USEPA applied for and hold the original patents for this use and have developed research data in a large study in Joplin, Missouri. In addition there is a significant body of other research and literature on this matter. Yard replacement is a recurring topic at the Community Advisory Group (CAG), in the media, and with your agencies. The concerns are the damage to trees, mud, quality of soil and reestablishing grass. Doe Run feels that this approach may address those concerns at the same time with equivalent or more permanent risk reduction.

Enclosed are thirteen documents that we have selected that provide support for the use of phosphate.

The first document is a patent on the use of apatite and other forms of phosphate to reduce bioavailability of lead in soil issued to Dr. James A. Ryan of the USEPA Risk Management Research Laboratories in Cincinnati. (Ryan.Jim@epa.gov <mailto:Ryan.Jim@epa.gov>; 513-232-6237). Dr. Ryan is also familiar with the Joplin Research work and is currently preparing a summary of that work for publication.

The second document is a recent literature review commissioned by the International Lead and Zinc Research Organization (ILZRO) prepared by Mike Ruby, et al of Exponent, Inc of Boulder, Colorado, dated 11-06-02 entitled "Critical Review of in situ Remediation Technologies for Lead, Zinc, and Cadmium in Soil".

The third document is the recently released report on the Joplin, Missouri, research on reduction of bioavailability through the introduction of stabilizing chemicals

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It is entitled "Final Report Lead Bioavailability Study; Phosphate Treatment of Lead-Contaminated Soils Joplin, Missouri, Jasper County Superfund Site". Also included are various background reports that were issued as attachments.

The fourth document is a letter dated December 9, 2002, from Dr. Mike McLaughlin, of the Australian National Laboratory CSIRO and Project Coordinator of the International Project for Remediation and Inactivation of Metals In Situ (IPRIMUS). This letter provides the project's interim conclusions relating to remediation of lead contaminated soils. This research is being conducted by a prestigious consortium of university and government laboratories under contract to the International Lead Zinc Research Organization.

The fifth document is an EPA synopsis of the use of apatite in stabilizing the mobility of lead in soil. 4.542N02001 Tech Trends: Issue number 44, March 2002. An apatite form of phosphate was tilled into the soil.

The sixth and seventh documents are letters from Forrester Environmental dated July 1st, 2002 and September 7, 2002. Their approach utilizes a similar phosphate chemistry system as others but in some cases can do so by utilizing a surface application of the chemicals.

The eighth document is a letter report dated March 1, 2002, from the University of South Dakota reporting on the lead phosphate they found in the yard of a house in Herculaneum, which had received fertilizer applications over a ten-year period. This is another demonstration that even surface fertilizer application of phosphate can encourage the formation of these stable, lower bioavailable materials.

The ninth document is a publication by Pengchu Zhang and James A. Ryan of the National Risk Management Research Laboratory in Cincinnati and John Yang of the Department of Geological Sciences at the University of Missouri in Columbia entitled "In Vitro Soil Pb Solubility in the Presence of Hydroxyapatite". This paper supports the rapid conversion of lead to lead chloropyromorphite in the digestive system well beyond the conversion that has already occurred in the soil. It is another factor suggesting that the field results may in fact be conservative. This paper appeared in the journal Environmental Science and Technology.

The tenth document also appeared in Environmental Science and Technology and is entitled "Lead Immobilization from Aqueous Solutions and Contaminated Soils Using Phosphate Rocks". The authors are from the University of Florida and Ohio State University.

The eleventh document appears in the same publication and is entitled "Mechanisms of Attenuation of Metal Availability in In Situ Remediation Treatments". The authors are Rebecca Hamon, Mike McLaughlin and Gill Cozens of CSIRO in Australia.

The twelfth document is entitled "Pyromorphite Formation from Goethite Adsorbed Lead", and was also prepared by Zhang and Ryan of the National Risk Management Research Laboratory.

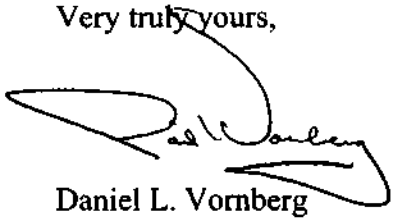
The thirteenth paper was published in the Journal of Environmental Quality and is entitled "Chemical Immobilization of Lead, Zinc, and Cadmium in Smelter-Contaminated Soils Using Biosolids and Rock Phosphate" by N.T. Basta, R. Gradwohl, K.L.Snethen and J. L. Schroder all from Oklahoma institutions.

The knowledge of the science has advanced to the state that phosphate can be applied from the surface or by tilling and mixing in either a liquid or solid form. This chemistry does not simply stabilize the lead from leaching but renders it of lower bioavailability so that if it is ingested, it passes through the human system with reduced uptake. In the Joplin study this reduction was as high as 69% as measured by the direct human uptake studies, the most direct measure. When an excess of phosphate is present, the conversion to more stable compounds may continue over time and would be expected to augment the bioavailability reduction. These processes are not reversible in the normal environment according to the IPRIMUS findings.

For a target level of 400 ppm at normal bioavailability, this approach could support a safe level of 1290 ppm total lead or even as high as 1600 total lead levels using the Jasper County protocols. One of the key advantages of this approach is that if a little excess is used it provides future protection if there is any minor recontamination. For this purpose it could also be surface spread for yards already addressed and is easy to maintain in the future with surface applications if needed. Another advantage is that it eliminates landfilling of the contaminated soil and the creation of yet another location to be concerned about. By avoiding the need to replace the soil, it also eliminates many of the perceived problems of bringing a potentially less fertile soil to a homeowner's yard sometimes leading to refusal to accept the program by the homeowner.

We respectfully request to use surface applied or tilled in phosphate chemistry as a remedy in those areas of Herculaneum yards or those portions of yards meeting the appropriate criteria under the AOC. The approval would comply with the requirements of CERCLA, which directs treatment is preferred and is the remedy of choice{CERCLA Section 121 (b)}.

Very truly yours,



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